

## Adnan Shahriar

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## Education

### Ph.D. in Mechanical Engineering

University of Texas at San Antonio (UTSA)

Graduation date: December 2023

CGPA: 3.94

### MS.C in Mechanical Engineering

University of Texas at San Antonio (UTSA)

Graduation date: December 2022

CGPA: 3.94

### BSc in Aeronautical Engineering (Aerospace Major)

Military Institute of Science and Technology, Bangladesh

Graduation date: December 2014

CGPA: 3.36

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## Techniques, Technical Skills

Numerical methods	MATLAB	Presentation Skills
Finite element method	Simulink	Collaboration Skills
Finite volume method	Abaqus	Technical Writing
Comp. Solid dynamics	Ansys	Project Management
Comp. Fluid dynamics	C++	People management
Comp. Heat transfer	Solidworks	
Data Analysis and Statistics	C# .NET framework	

## Work Experience

### Senior Simulation Integration Engineer

L&T Technology Services

Plano, TX

January 2024- Present

Work summary:

- Fast learner with expertise in developing physical systems, as demonstrated by the support and development of several plant models for John Deere.
- Ability to work in a collaborative team-oriented environment with experience in embedded system design, resulting in the development of code generation procedures for HIL applications.
- Problem-solving skills with software development expertise, as demonstrated by the activities in front-end GUI development.

### Physics-based Modeling Simulation Engineer

Universal Real-Time Power Conversion LLC

4201 N 27th St, Milwaukee, WI, 53216

June 15 – September 14, 2022

Work summary:

- Ability to conduct numerical experiments with expertise in developing mathematical models and algorithms, as demonstrated by the development of 1 automated meshing code from CAD files.
- Fast-paced, dynamic innovator with wide-ranging expertise in FEA and CFD modeling, as evidenced by the development of a Multi-physics modeling platform for topology optimization.
- Knowledge of current industry trends with wide-ranging expertise in the field of Computational mechanics as evidenced by work with the CTO of the company.
- Documentation and reporting skills, with industry-standard software development practices, leading to the completion of the 1 code documentation.

### CAE Advisor (Volunteer)

hatchTank Innovations

San Antonio, Texas 78023, US

January – December 2022

Work summary:

- Technical communication skills with strong proficiency and experience in CFD and FEA, as evidenced by mentoring 10+ employees of hatchTank innovations on coupled Eulerian-Lagrangian (CEL) modeling.
- Highly motivated with Machine Design and Geometric Dimensioning expertise, leading to the conceptual design of 2 energy harvesting devices.
- Ability to build a robust testing plan with in-depth knowledge of Computational mechanics, leading to the development of 1 numerical testbed for energy generation devices.
- Ability to design and conduct numerical experiments and expertise in modeling Thermo-Fluid simulations, as evidenced by a conceptual design of an aerodynamic HVAC inlet.

## Research Experience

### Resilient Extraterrestrial Habitats Institute

Mann Building Suite 266, 203 S Martin Jischke Dr., West Lafayette, IN 47907

<https://www.purdue.edu/rethi/>

May 2019 – Present

#### Funding source:

Montoya, A. (Institutional Lead), "Resilient Extraterrestrial Habitats Institute (RETHi)" Sponsored by NASA, Leading Institution: Purdue University (Principal Investigator: S. Dyke), Collaborators: University of Connecticut, and Harvard University, Total funds: \$15 M, UTSA funds: \$500,000 (September 1, 2019 – August 31, 2024)

#### Work summary:

- Curious, imaginative, and dedicated researcher with the ability to develop real-time model-based Systems, as evidenced by the completion of 1 research project funded by NASA.
- Ability to work in a collaborative team-oriented environment and experience with modeling and integrating multi-physics models (Structural, Thermal, Fluid, and Rigid bodies), as evidenced by the development of the Modular coupled virtual testbed (MCVT).
- Research and analysis expertise with in-depth knowledge of System identification techniques, resulting in the development of Mode shapes, Natural frequencies, and CAD model of 1 experimental space habitat.
- Ability to create new methods and technologies in the field of fracture mechanics and damage, such as holes, voids, and inclusion in three dimensions, resulting in 1 journal in the field of Extended FEM.
- Ability to create new methods and technologies in the field of Acoustics and Vibrations, resulting in 2 journal publications on Acoustic waves induced by hypervelocity impact.
- Growth-oriented researcher with Software development expertise based on numerical methods, resulting in the development of 3 Software for Engineering analysis and design.

### Structural Vulnerability of Coastal Bridges Under Extreme Hurricane Conditions

The University of Texas at San Antonio

March 15, 2018- August 15, 2019

#### Funding source:

Montoya, A. (Principal), A. Matamoros (Co-Principal), and F. Testik (Co-Principal), "Structural Vulnerability of Coastal Bridges Under Extreme Hurricane Conditions" Sponsored by Transportation Consortium of South Central States, \$50,000, (March 15, 2018- August 15, 2019)

#### Work summary:

- Ability to design and conduct numerical experiments and expertise in developing Eulerian models to perform fluid dynamics simulations, as evidenced by the publication of 1 conference paper on wave generation.
- Flexible and versatile researcher with in-depth knowledge and advanced experience in using Coupled eulerian-lagrangian modeling to simulate fluid-structural interactions, resulting in the vibration and stress analysis of coastal bridges subjected to hurricane events
- Scientific and technical writing expert with numerical experiment-related data analysis skills, resulting in 7+ publications in several journals and conferences on bridge engineering and design.
- Growth-oriented researcher with experience with High-performance computing, as demonstrated by the Coupled-Eulerian-Lagrangian simulation using a Supercomputer.

## **Understanding Interactions of Chemical Contaminants to DOE Facility Material using Spectroscopic Techniques**

The University of Texas at San Antonio

April 1, 2017 – March 31, 2018

Funding source:

Shipley, H. (Principal), A. Montoya. (Co-Principal) and K. Nash (Co-Principal), "Understanding Interactions of Chemical Contaminants to DOE Facility Material using Spectroscopic Techniques," Sponsored by Department of Energy/ Savannah River Nuclear Solutions, \$273,134 (April 1, 2017 - March 31, 2018).

Work summary:

- Technical literacy with an ability to determine crystal structures of materials, as evidenced by the publication of 1 journal paper in Materials Science in Semiconductor Processing.
- Problem-solving skills with advanced experience in image processing, resulting in the determination of crystal structures of MoSe<sub>2</sub> NC from TEM and HRTEM images.
- Research and analysis expertise, with advanced knowledge of materials, as demonstrated by the study of the interaction between Hg and steel substrate using molecular dynamics simulation.

## **Interaction with Graphene and graphene derivatives with cell membrane**

The University of Texas at San Antonio

January 01, 2017 – December 31, 2017

Work summary:

- Energized researcher with advanced knowledge of crystal structures of materials, as demonstrated by the characterization of Graphene mechanical properties.
- Research and analysis expertise and experience in cell biology and structures, as evidenced by the characterization and verification of POPC and water interaction.
- Technical literacy, with advanced knowledge of scientific computing, resulted in the conduction of molecular dynamics simulations to study the interaction between graphene derivatives and cell membranes.

## **UAV Fuselage design and structural analysis**

Military Institute of Science and Technology, Dhaka, Bangladesh

January 01, 2013 – December 31, 2015

Work summary:

- Problem-solving skills with experience in designing Aircraft structures and performing stress analysis, leading to the design of 1 lightweight UAV aircraft structure as the Undergraduate thesis.
- Growth-oriented researcher with extensive experience in CAD modeling, as demonstrated by the CAD model of the designed aircraft.
- Research and analysis expertise and experience with aircraft conceptual design and design optimization, as evidenced by 2 publications on conceptual aircraft design.

## Teaching Experience

### Numerical methods

May 2018- August 2018 and January 2019 – May 2019

- Technical expertise with in-depth knowledge of Numerical methods and applications, as evidenced by mentoring 200+ undergraduate students in the Numerical Methods lab.
- Ability to surpass expectations, as demonstrated by the introduction of Newton Raphson and Taylor-series expansion for more than 1 dimension, Neural network models, and computational geometry concepts for the first time in the course history.
- Systemization expert with an ability to design course materials to maximize student learning, as evidenced by around 10% increase in A of the Numerical methods lab from the previous year.
- Virtual training expertise and experience with data visualization tools and techniques, as demonstrated by the development of online resources for the course. [Online]. Available: <https://youtu.be/Gzu3rn811ao>

### Mechatronics

August 2018 – December 2018

- Strong communication skills, with advanced experience in Circuit diagrams, Sensors, and Digital signal processing using National Instrument MyDAQ, as evidenced by the mentorship of 120 undergraduate students in the Mechatronics lab.
- Research and development experience with an ability to design Sensors, leading to the conceptual design of a humidity sensor for smart habitat applications.
- Technical literacy with varying ranges of experience in Embedded system design using Arduino, resulting in the completion of 6+ animatronics projects under my supervision in the lab.  
[Online]. Available: [https://www.youtube.com/playlist?list=PLc7bpbeTik77kdx4O8HoIr\\_Ep76HiSwil](https://www.youtube.com/playlist?list=PLc7bpbeTik77kdx4O8HoIr_Ep76HiSwil)

### Materials Engineering & Lab

January 2017 to May 2018

- Mentorship expertise and the ability to develop course materials regarding material science, as evidenced by mentoring 120 undergraduate students in the material science lab.
- Ability to design and conduct experiments with advanced knowledge in material science, as demonstrated by the successful completion of lengthy tests, including grain visualization of different materials.
- Knowledgeable in documentation, safety, and the appropriate handling of materials, leading to the completion of several experiments, including heat treatment of steel and impact tests without any incident.
- Communication skills and a strong theoretical background in the mechanics of materials led to the inclusion of an introductory theory section in the lab sessions.
- Ability to manage people and experience with data visualization tools and techniques, as demonstrated by the development of online resources for the course. [Online]. Available: <https://youtu.be/SkaZX0MqueY>

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## Research/Scholarly/Creative Works

### Published Journal Articles-Peer Reviewed

1. A. Majlesi, A Behjat, **A Shahriar**, H Khodadadi, S. Dyke, J. Ramirez, and A. Montoya, "Influence of Ductility on the Performance of Lunar Habitat Structures Under Recurrent Disturbances," AIAA Journal, p. 1-14, 2024. <https://doi.org/10.2514/1.J063698>
2. **A. Shahriar**, A.J. Mostafa, "A p-Refinement Method Based on a Library of Transition Elements for 3D Finite Element Applications," Mathematics, vol. 11, no. 24, p. 4954, 2024. <https://doi.org/10.3390/math11244954>
3. **A. Shahriar**, H. Khodadadi, A. Majlesi, and A. Montoya, "A Finite Difference Scheme for the Large-Deflection Analysis of Non-Prismatic Cantilever Beams," Discontinuity, Nonlinearity, and Complexity, vol. 13, no. 2, p. 351-360, 2024.
4. **A. Shahriar**, A. Majlesi & A. Montoya, "Modeling holes and voids in three dimensions using a single element within the Extended Finite Element framework," International Journal for Computational Methods in Engineering Science and Mechanics, vol. 25, no 2, p. 56-79, 2024. <https://doi.org/10.1080/15502287.2023.2274025>
5. **A. Shahriar**, A. Majlesi, A. Montoya "A General Procedure to Formulate 3D Elements for Finite Element Applications," Computation, vol. 11, no. 10, p. 197, 2023. <https://doi.org/10.3390/computation11100197>
6. S. Seok, **A. Shahriar**, A. Montoya et al. "A finite element approach for simplified 2D nonlinear dynamic contact/impact analysis," Arch Appl Mech vol. 93, no. 9, p. 3511–3531, 2023. <https://doi.org/10.1007/s00419-023-02451-y>
7. Khodadadi Koodiani H, A. Majlesi, **A. Shahriar** and A. Matamoros, "Non-linear modeling parameters for new construction RC columns", Front. Built Environ, vol. 9, p. 1108319, 2023. <https://doi.org/10.3389/fbuil.2023.1108319>
8. A. Balati, A. Bazilio, **A. Shahriar**, K. Nash and H. J. Shipley, "Simultaneous formation of ultra-thin MoSe<sub>2</sub> nanosheets, Inorganic Fullerene-Like MoSe<sub>2</sub> and MoO<sub>3</sub> quantum dots using fast and ecofriendly Pulsed Laser Ablation in Liquid followed by microwave treatment," Materials Science in Semiconductor Processing, vol. 99, p. 68-77, 2019. <https://doi.org/10.1016/j.mssp.2019.04.017>
9. Majlesi, **A. Shahriar**, N. Reza, H. Khodadadi Koodiani, A. Montoya, A. Du and A. Matamoros, "Digital Filter Design for Force Signals from Eulerian–Lagrangian Analyses of Wave Impact on Bridges," Journal of Marine Science and Engineering, vol. 10, no. 11, p. 1751, 2022. <https://doi.org/10.3390/jmse10111751>
10. A. Montoya, A. Matamoros, F. Testik, **A. Shahriar**, R. Nasouri and A. Majlesi, "Structural Vulnerability of Coastal Bridges Under Extreme Hurricane Conditions," in Transportation Consortium of South-Central States, 2019.

## Published Conference Proceedings-Peer Reviewed

1. **A. Shahriar**, S. Reynolds, M. Najarian and A. Montoya, "Development of a Computational Framework for the Design of Resilient Space Structures," Earth and Space 2021, p. 1263-1271, 2021.  
<https://doi.org/10.1061/9780784483305.014>
2. Y. Fu, Z. Wang, A. Maghareh, S. Dyke, M. Jahanshahi, and **A. Shahriar**, "Scalable Impact Detection and Localization Using Deep Learning and Information Fusion," Structural Health Monitoring 2021: Enabling Next-Generation SHM for Cyber-Physical Systems - Proceedings of the 13th International Workshop on Structural Health Monitoring, IWSHM 2021, p. 424-431, 2021. <https://doi.org/10.12783/shm2021/36285>
3. **A. Shahriar**, A. Majlesi, R. Nasouri, A. Montoya, A. Matamoros, and F. Testik, "Generation of Periodic Wave Using Lagrange-Plus Remap Finite Element Method for Evaluating the Vulnerability of Coastal Bridges to Extreme Weather Events," Tran-SET 2020, p. 133-140, 2020. <https://doi.org/10.1061/9780784483305.014>
4. A. Majlesi, R. Nasouri, **A. Shahriar**, D. Amori, A. Montoya and A. Du, "Explicit Finite Element Analysis of Coastal Bridges under Extreme Hurricane Waves," Tran-SET 2021, p. 324-331, 2021.  
<https://doi.org/10.1061/9780784483787.032>
5. A. Majlesi, D. Amori, A. Montoya, A. Du, A. Matamoros, **A. Shahriar**, and R. Nasouri, "Eulerian-Lagrangian simulation of wave impact on coastal bridges," Bridge Safety, Maintenance, Management, Life-Cycle, Resilience and Sustainability, p. 117-125, 2022.
6. R. Nasouri, **A. Shahriar**, A. Majlesi, A. Matamoros, A. Montoya, and F. Testik, "Hydrodynamic demands on coastal bridges due to wave impact", Bridge Maintenance, Safety, Management, Life-Cycle Sustainability and Innovations, p. 1241-1248, 2021.
7. A. Majlesi, R. Nasouri, **A. Shahriar**, A. Montoya, and A. Matamoros, "Structural Vulnerability of Coastal Bridges under a Variety of Hydrodynamic Conditions," Tran-SET 2020, pp. 120-125, 2020.  
<https://doi.org/10.1061/9780784483305.012>
8. Z. Wang, **A. Shahriar**, B. Wogen, M. Jahanshahi, A. Maghareh, A. Montoya and S. Dyke, "A Fault Detection and Diagnosis Algorithm for Extra-terrestrial Habitats and its Experimental Validation," in EMI, Baltimore, MD, 2022.
9. Nasouri, R., **A. Shahriar**, A. Matamoros, A. Montoya and F. Testik. Evaluating the Hydrodynamic Response of Coastal Bridges during an Extreme Weather Event. 2019 Tran-SET Conference Proceedings.  
[https://www.matec-conferences.org/articles/mateconf/pdf/2019/20/mateconf\\_tran\\_set2019\\_01002.pdf](https://www.matec-conferences.org/articles/mateconf/pdf/2019/20/mateconf_tran_set2019_01002.pdf)
10. J. Nawar, N. Nawal Probha, **A. Shahriar**, A. Wahid and S. R. Bakaul, "Conceptual Design of a Business Jet Aircraft," in International Conference on Mechanical, Industrial and Energy Engineering, Khulna, Bangladesh, 2014.

### Journal Article- Currently under Peer Review

1. **A Shahriar**, A. Majlesi, A. Montoya, and H. Montoya " Coupling Independent Solid Mechanics-Based Systems with a Common Interface in a System-of-Systems Modeling Framework," AIAA Journal.
2. A. Mohsen, Y. Fu, H. Montoya, M. Krishnan, L. Vaccino, L. Chebbo, S. Rhee, **A. Shahriar**, Z. Wang, A. Magareh "HabSim: A Modular Coupled Virtual Testbed for Simulating ExtraTerrestrial Habitat Systems" AIAA Journal.

### Journals under Preparation

1. **A Shahriar**, A. Majlesi, and A. Montoya, "Thermal topology optimization of structural protective layer of lunar habitats"
2. **A Shahriar**, A. Majlesi, and A. Montoya, "A computationally time-efficient method for implementing pressure load to FE models with lagrangian elements"
3. **A Shahriar**, A. Majlesi, and A. Montoya, "Topology optimization of 3D printed internal cooling channel of lunar habitats using the Darcy flow model"

### Oral Presentations

1. **A. Shahriar**, A. Majlesi and A. Montoya, "Reduced-Order Modeling for Hyper-Velocity Impact on Thin Structures," in EMI, Baltimore, MD, 2022.
2. **A. Shahriar**, S. Reynolds, A. Majlesi and A. Montoya, "Development of a Physics-Based Model to Simulate an Extra-terrestrial Habitat with Damageable and Repairable Capabilities," in EMI, Baltimore, MD, 2022.
3. Z. Wang, **A. Shahriar**, B. Wogen, M. Jahanshahi, A. Maghareh, A. Montoya and S. Dyke, "A Fault Detection and Diagnosis Algorithm for Extra-terrestrial Habitats and its Experimental Validation," in EMI, Baltimore, MD, 2022.
4. **A. Shahriar**, "MCVT: Structural Mechanical Model," Resilient Extra-terrestrial Habitat Institute, Annual Review, 2021. [Online]. Available: [https://youtu.be/TAA66P\\_UXIM](https://youtu.be/TAA66P_UXIM).
5. **A. Shahriar**, "Computational Model for Habitat Structures Beyond Earth," Three-Minute Thesis, 2021. [Online]. Available: <https://rrpress.utsa.edu/items/4d1a04f4-08fd-423d-957f-886608ee12d0>

### Other online creative activities

1. Thermal topology optimization of lunar habitat: <https://youtu.be/EGVZgg1pb6Q>
2. CFD modeling and Bridge structure analysis: <https://youtu.be/DTQD6CamibM>
3. Lipid bilayer formation by free POPC molecules in water: <https://www.youtube.com/watch?v=1F-n2GzWqcs>
4. Graphene unit cell to sheet formation: <https://www.youtube.com/watch?v=SkaZX0MqueY>
5. UAV structure design: <https://www.youtube.com/watch?v=dcf8jay01C8&t=1s>



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## References

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### **Dr. Debiprasad Panda**

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## Affiliations, Awards & Hobbies

- Badge: Communication: Three-Minute Thesis (2021)
- Certificate: The Student Leadership Challenge (2021)
- College of Engineering Award (2020)
- University Life Awards: Outstanding Graduate Student (2020)
- Valero New Ph.D. Competitive Research Scholarship Awards (2017)
- Futurist ENFP and Fitness enthusiasts